



February 23, 2005

05-RF-00156

RFPO Project Management  
Joseph A. Legare, Director  
Project Management Division  
DOE, RFPO

**TRANSMITTAL OF THE FINAL PRE-DEMOLITION SURVEY SUMMARY REPORT FOR  
BUILDING 776/777 – DCD-032-05**

This letter transmits the Final Pre-Demolition Survey Summary Report for Building 776/777. Please transmit a copy of this summary report to the Colorado Department of Public Health and Environment, (CDPHE) and to Oak Ridge Institute of Science and Education (ORISE) for their review and concurrence

If you have any non-radiological questions, please contact Carolyn Hicks at 303-966-5773. If you have any radiological questions, please contact Terry Vaughn at 303-994-1267.

Upon approval of this final summary report, Kaiser-Hill is requesting approval to demolish Building 776/777.

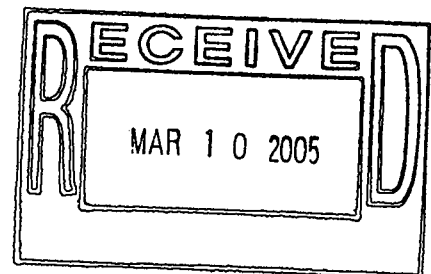
  
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TLV:plh

Attachment  
As Stated

Original and 1 cc – Joseph A. Legare

cc:  
Richard Schassburger – DOE, RFPO



ADMIN RECORD

# Final Summary Report for the Radiological and Non-Radiological Characterization of Building 776/777

## Executive Summary

The decommissioning process for Building 776/777 involves decontamination, removals, and application of controls inside the building before demolition and application of controls outside the building during demolition. The Building 776/777 Decommissioning Operations Plan (DOP) addressed the activities associated with preparing the facility for decontamination and demolition. Following decontamination and/or removal efforts, a final characterization was conducted to verify that residual contamination was consistent with the objectives of the DOP and ALARA-based decontamination efforts. Final surveys were conducted in accordance with the project-specific characterization plans; this document summarizes the results of the characterization efforts.

Kaiser-Hill (K-H) has completed the radiological and non-radiological characterization of Building 776/777. This survey was performed in accordance with the approved "Radiological Pre-Demolition Survey Plan" dated August 8, 2003 and with the "Project-Specific Non-Radiological Characterization Plan for Building 776/777" dated September 16, 2003.

In accordance with the 776/777 DOP, Appendix I, the preparation of the facility for demolition is conducted in consultation with the Colorado Department of Public Health and Environment (CDPHE) and is based on a series of decisions primarily related to maintaining releases to the environment and doses to the workers as low as reasonably achievable (ALARA).

As agreed through a consultative process, a final Average Surface Contamination Value (ASCV) in disintegrations per minute per 100 square centimeters (dpm/100 cm<sup>2</sup>) has been calculated from the 46 remediated survey units within Building 776/777. The final calculated ASCV is 45,550 dpm/100 cm<sup>2</sup>. This ASCV has the potential during the demolition of 776/777 to result in a conservative offsite dose at the Site fence line of 0.00163 millirem (mrem), which is below the 0.1 mrem maximum dose goal for this project. This fence line dose is calculated using an air-modeling program developed by the USEPA titled "Industrial Source Complex Short-Term (ISCST3)." This air-modeling is described in the K-H developed "Buildings 776/777 Air Modeling Technical Document."

An independent verification (IV) of the 776/777 pre-demolition survey activities has been performed by the Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) to verify the process implemented by the project to characterize the building. The ESSAP survey efforts will be documented in a separate report to DOE/RFPO.

The non-radiological characterization effort has verified that hazardous wastes, chemicals, beryllium, PCBs, and asbestos have been removed from the facility, with the

exception of a large lead collar in the wall between rooms 430 and 443, which will be removed during demolition.

## 1. Introduction/Scope

A 1969 fire in Building 776/777 caused extensive radiological contamination throughout the building. Although efforts to decontaminate the building resulted in resumption of operations, substantial radiological contamination could not be removed and was fixed in place. The extensive nature of the contamination and structural integrity of Building 776 precludes bringing the facility to the unrestricted release criteria.

Through an established consultative process between CDPHE, DOE/RFPO, and K-H, it was determined that 776/777 would be decontaminated through ALARA-based efforts to less than  $455 \mu\text{Ci}/\text{m}^2$ , averaged over the entire building surfaces. This value is based on ensuring the building average will comply with the 0.1 mrem maximum dose goal during demolition of 776/777. In order to support the decontamination and decommissioning of Building 776/777, the following documents were developed:

- Building 776/777 Closure Project Decommissioning Operations Plan (DOP)
- Project-Specific Radiological Pre-Demolition Survey Plan (Project PDSP)
- Project-Specific Non-Radiological Characterization Plan for Building 776/777
- Buildings 776/777 Air Modeling Technical Document
- Demolition Work Package

This report summarizes the results of the radiological and non-radiological pre-demolition characterization process in support of the demolition of Building 776/777.

## 2. Radiological Characterization

Radiological characterization of Building 776/777 was conducted in accordance with the Project PDSP. The following sections present the survey results, address areas requiring special controls for demolition, and discuss building modifications made after the final surveys were conducted.

### 2.1. Final Survey Results

In support of the radiological pre-demolition survey, Building 776/777 was divided into 46 survey units. For most of these survey units, an in-process (pre-remediation characterization) survey report and a final (post-remediation) survey report were developed to document the overall radiological survey process through the remediation process to final encapsulation. This process was the documentation of the ALARA-based decontamination effort, and the approval and consultation for each survey unit was documented in contact records, which are included in the project administrative record.

In a few cases, a survey unit only required a single survey report due to little or no remediation within the survey unit. Survey unit reports were discussed and evaluated through the consultative process with CDPHE prior to final status or encapsulation.

Upon completion of the initial ALARA-based decontamination efforts and the final characterization surveys for each survey unit, Radiological Engineering calculated an average surface contamination value for the unit (ASCV<sub>U</sub>). Although the ALARA based decontamination effort was not based on a specific decontamination level, the Project PDSP indicated that the ASCV for the building had to be less than 455  $\mu\text{Ci}/\text{m}^2$  averaged over the entire building. This ACSV was derived from extrapolating data (linearly) from the Building 776/777 Air Modeling Technical Document based on the day-to-day (four month release) scenario.

The ASCV in the Project PDSP coincides with the commitment made in the Building 776/777 major modification to the Decommissioning Operations Plan (DOP, Appendix I). The ASCV was not used to make decisions with respect to decontamination and removals in the building; these decisions were made using the work process outlined in the DOP. The ASCV is an upper bounds that indicates the absolute maximum allowable contamination level.

Table 1 outlines the pre-remediation and post-remediation Average Surface Contamination Value (ASCV) for each of the 46 survey units and the final overall ASCV for Building 776/777. Table 1 also lists the dates of the CDPHE Contact Records prepared for each survey unit, describing the radiological and non-radiological pre-demolition conditions and documenting CDPHE concurrence.

<b>Table 1 - Final Source Term Values</b>			
<b>Survey Unit</b>	<b>Contact Record Date</b>	<b>Pre-remediation ASCV (dpm/100 cm<sup>2</sup>)</b>	<b>Post-remediation ASCV (dpm/100 cm<sup>2</sup>)</b>
1	9/30/03	196,000,000	420,246
2	1/20/05	70,676	8,214
3	2/15/05	2,469,011	33,984
4	1/13/05	752,360	14,604
5	11/17/04	survey unit was removed	survey unit was removed
6	2/9/05	35,964	35,964
7	1/17/05, 1/19/05	264,158	11,343
8	2/7/05	34,608	34,608
9	1/26/05	6,299,302	50,715
10	11/17/04	1,452,603	86,806
11	2/2/04	4,364,707	40,028
12	12/9/04	6,058,986	111,694
13	1/13/05	2,720,445	37,361
14	2/2/05	1,270,082	13,534
15	2/9/04	60,313	23,310
16	6/24/04	1,655,542	43,125
17	2/7/05	18,019	18,019
18	2/9/04	532,841	17,424
19	6/17/04	448,154	48,157
20	6/8/04	111,132	17,185
21	4/7/04	243,707	13,077

Table 1 - Final Source Term Values			
Survey Unit	Contact Record Date	Pre-remediation ASCV (dpm/100 cm <sup>2</sup> )	Post-remediation ASCV (dpm/100 cm <sup>2</sup> )
22	3/15/04	23,053	8,946
23	4/28/04	37,611	47,563
24	2/9/04	9,201	4,311
25	3/15/04	18,445	12,099
26	1/24/05	67	67
27	12/13/04	97,468	10,655
28	1/19/05	14,765	14,765
29	12/28/04	177,496	25,246
30	12/28/04	32,858	33,627
31	11/29/04	315,782	36,914
32	1/7/05	264,158	46,500
33	1/19/05	27,081	27,081
34	1/19/05	17,189	17,189
35	11/17/04	34,814	9,452
36	11/17/04	50,317	16,786
37	11/17/04	17,316	15,605
38	2/15/05	1,301,121	108,408
39	12/8/03	31,182	19,504
40	6/24/04	248,610	174,213
41	11/17/04	16,705	16,705
42	1/24/05	44,400	44,400
43	12/9/04	1,453,262	995,034
44	N/A	4,892,880	N/A*
45	N/A	1,152,180	N/A*
46	N/A	297,469	N/A*
Total Building ASCV		5,454,655 dpm/100 cm <sup>2</sup> 245.7 $\mu$ Ci/m <sup>2</sup>	45,550 dpm/100 cm <sup>2</sup> 2.052 $\mu$ Ci/m <sup>2</sup>

\*The underslab buried equipment data is not included in the building shell ASCV calculations. Pursuant to consultative process agreements and approved building PDS plan, all underslab contamination is excluded from the ASCV inventory and will be remediated after building demolition by KH Environmental Restoration.

NOTE: Survey units which required minimal or no remediation are shown in the above table with the same ASCV for pre- and post-remediation data.

As indicated, the final calculated ASCV for Building 776/777 is 45,550 dpm/100 cm<sup>2</sup>. This final ASCV will support compliance with the 0.1 mrem offsite dose goal at the Site fence line during demolition of 776/777. An analysis of the potential radionuclide emission modeling was completed for the Building 776/777 demolition and slab remediation project. The USEPA ISCST3 model was used for the model to estimate the dose to the most impacted public receptor. The highest modeled dose was 0.00163 mrem/year, which is far below the monitoring threshold of 0.1 mrem/year in the Site Integrated Monitoring Plan and the 10 mrem/year standard from 40 CFR 61, Subpart H.

## 2.2. Areas Requiring Special Controls

A total of nineteen areas were identified through the ALARA decontamination process that require additional or special controls during demolition. These areas had inaccessible areas, structural issues, or under slab conditions that impacted the remediation effort. These nineteen areas have been identified in the building with a distinctive color (orange or blue) to allow appropriate special handling and controls during final building demolition. These special controls are contained in the demolition work package for building 776/777 which include, but are not limited to the use of increased dust suppression, waste segregation and handling, and special demolition equipment cutting and shearing techniques.

## 2.3. Pre-Demolition Building Modifications

As the final survey process evolved, it became necessary to perform minor internal building modifications to support ongoing building remediation. Since these modifications occurred after the review and concurrence of the final survey reports by CDPHE and DOE/RFPO, these modifications were not documented in individual final survey reports. Therefore, CDPHE and DOE/RFPO concurrence was obtained on the internal modifications through frequent building status meetings, and it was agreed that the modifications would be documented in this final summary report without revision to the individual final survey reports. The following is a listing of these modifications identified by survey unit.

Survey Unit	Modification	Reason for Modification
15, 21, 22, 23, 24	interior walls removed	dust control during demolition
9, 11, 13	interior walls removed	access for demo equipment
10 (basement)	ceiling pushed into basement	temporary storage of rubble
3, 4	interior walls removed	staging of waste containers

## 3. Non-Radiological Characterization

Non-radiological characterization was conducted in accordance with the Project-Specific Non-Radiological Characterization Plan for Building 776/777. This plan specified that the final characterization report will include details on hazardous wastes, beryllium, PCBs, and asbestos characterization. These items were addressed in detail in the CDPHE contact records for each survey unit, listed in Table 1, and included in the project administrative record. Brief summaries are provided in the following sections.

### 3.1. Hazardous Wastes

RCRA regulated hazardous waste management units have been closed in accordance with the Building 776/777 DOP. The CDPHE contact records prepared for each survey unit provide details of regulated units within each area and the methods of closure, along with references to required approvals received from CDPHE. In some cases, such as closure by removal, CDPHE approval is not required, but the method of closure is documented in the contact records.

In addition to RCRA units requiring formal documentation of RCRA closure activities (i.e., RCRA permitted units, interim status units, and mixed residue units), Building 776/777 contained numerous RCRA satellite accumulation areas, 90-day storage areas, universal waste storage areas, and CERCLA storage areas. These areas have been appropriately closed, and no evidence of releases from these areas was observed.

In addition to closure of RCRA units, chemicals and hazardous substances have been removed from the facility, including gas cylinders, batteries, light bulbs and tubes (with the exception of a minimal number that will remain for safety purposes), mercury switches, poured lead piping joints, lead shielding and flashing, and chemicals that were previously stored in the building. One exception is a lead collar in the wall between Rooms 430 and 443 that will be removed during demolition; this is documented in a CDPHE contact record dated January 7, 2004.

### 3.2. Beryllium

Beryllium regulated and controlled areas have been closed. Details of the beryllium surveys, including numbers and locations of samples as well as final results are included in the CDPHE contact records listed in Table 1 for each survey unit.

### 3.3. PCBs

PCB hazards and equipment have been removed, including ballasts, capacitors, and transformers. The notification to the receiving facilities that will accept PCB bulk product wastes from demolition are on file at the site.

### 3.4. Asbestos

Asbestos abatement has been successfully completed in accordance with CAQCC Regulation No. 8. The required certification will be provided in the Demolition Notification submitted to CDPHE prior to demolition.

## 4. Conclusion

The non-radiological characterization has resulted in the successful removal of hazardous wastes and substances, beryllium, PCBs, and asbestos from the facility. With one exception, a lead collar located in room 430 will be removed during demolition. Waste from the building demolition will be compliantly managed as low-level debris for disposal and the lead collar will be managed as low-level mixed waste.

In summary, ALARA based decontamination of building 776/777 has been completed. Based on the final survey results presented in each survey unit report, the principles of ALARA established in the DOP were successful in reducing the final source term below the ASCV of  $455 \text{ uCi/m}^2$ . Further decontamination of the building at this point increases the risks (industrial and radiological) to workers without much benefit in source term reduction. Final encapsulation activities have been completed and the building is ready

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for demolition. Approved methods to control the remaining contamination will be applied during demolition.